

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Hypodermic Syringes

I, FRITZ LINDER, of Skaerhamn, Sweden, a Swedish subject, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to improvements in hypodermic syringes, and more particularly to a device for supporting a hypodermic syringe and facilitating its use in giving an injection.

It is one of the objects of the present invention to provide a hypodermic syringe with a simple telescopic device which is connected to the front end of a hypodermic syringe to surround the hypodermic needle and, when in the extended position, to hold the syringe and the needle thereon arrested at a certain distance from the point on the body where the injection is to be made, and which is further adapted to be suddenly released from such extended position and to telescope suddenly when the syringe with the new device thereon is pressed with sufficient force upon the body so that the hypodermic needle will then be plunged abruptly into the skin.

In accordance with the invention, the new device comprises in combination with a hypodermic syringe a pair of tubular members, telescopically slidable along each other the inner member being secured to the head portion of the hypodermic needle and surrounding the upper part of the needle, the outer member having an annular end surface adapted to be placed on a body, and means on said members for locking same to each other in the extended position, said locking means being adapted to disengage when said tubular members are pressed in the extended position with a certain force upon said body so that said tubular members will be suddenly pushed together, and the hypodermic needle will be suddenly plunged into said body portion. Since the inner tubular member is carried by the head portion of the hypodermic needle and

the outer tubular member is placed upon the skin at the point where the injection is to be made and then pressed by the inner member or the hypodermic syringe thereon upon the skin, the hypodermic needle will be suddenly propelled forwardly to plunge into the skin. Such a device is especially of advantage to a slightly timid person giving an injection and particularly to a person giving himself an injection since, after pressing the syringe with the new device thereon upon the point where the injection is to be made, a reflex movement of the hand holding the syringe will no longer retard or delay the plunging of the needle into the skin. Such plunging movement will then occur so suddenly that the person receiving the injection will feel very little, if any, pain. Furthermore, since the device must be pressed upon the body before the hypodermic needle is permitted to move relative to the outer tubular member for plunging into the skin, the area around the point of impact of the needle will be numbed by such pressure so that the person receiving the injection will hardly feel the inserting of the needle.

It is another object of the invention to construct a device of the type described in a manner so as to be applicable to almost any kind of hypodermic syringe available on the market and to be easily mountable thereon or removable therefrom. Furthermore, the device should be made of the smallest possible diameter so as to permit the hypodermic needle also to be inserted at an oblique angle into the body of a patient, while the annular contact surface of the device still rests fully on the skin. This will in many cases not be possible if the device is made of a greater diameter.

In its preferred form, the new device is adapted to be connected to the head of the hypodermic needle since in most hypodermic syringes, even though differing in other respects, the needle head is usually of the same design. However, for connecting the device

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to needle heads of different designs or sizes, the present invention further provides a suitable adapter.

5 The new device may be removably secured to the head of the hypodermic needle either by a conical fit, a snap joint, screw threads, a bayonet lock, the inherent resiliency of its material, or any other suitable means.

10 According to the invention, the two tubular members which are telescopically slidable along each other are provided with locking portions which are preferably adapted to interengage resiliently with each other when the device is in the extended position. According to one preferred embodiment this is accomplished by providing one of the tubular members with at least one, but preferably several spring fingers which are movable in a radial direction. Each of these spring fingers has a cam-like locking projection which is adapted to engage into a suitable aperture in the other tubular member when the device is in the extended position. The or each projection and the wall surfaces of the receiving apertures are inclined at such an angle that they will not disengage from each other until the pressure with which the two tubes are pressed toward each other has reached a certain force, and that they will then disengage from each other very suddenly.

30 A further important object of the invention consists in providing the outer tubular member with an extension tube which is adjustable thereon so as to permit the length of the device to be adjusted. This extension tube may serve for the additional purpose of forming a projection on the outer tubular member which may be easily and firmly gripped to pull the outer tube to the extended position.

40 It has further been found in actual practice that it will be of advantage if at least the outer tubular part of the device is made of a synthetic plastic material. The locking action between the two telescopic tubes may then be attained by suitable conical portions which firmly engage with each other and tightly press against each other when the tubes are in the fully extended position. The plastic material of which at least the outer tube is made should then have a certain resiliency at least within the area of its conical portion so that, when the two tubes are pressed toward each other with sufficient force, the conical portion of the outer tube will bulge outwardly and thereby suddenly release the conical portion on the inner tube so that the latter with the hypodermic needle thereon will be suddenly propelled forwardly to plunge into the body portion upon which the outer tube is pressed.

60 Since most synthetic plastic materials and particularly those of the thermoplastic type are usually elastic to some degree, one of the tubes may also be provided with one or more cam-like projections which are adapted to snap resiliently into suitable recesses in the other tube

when the tubes are pulled to the fully extended position, and which will suddenly disengage from these recesses when sufficient pressure is applied. Thus, no special spring fingers or the like need be applied as in the first-described embodiment of the invention, but the inherent resiliency of the material may be utilized to attain the desired locking and sudden releasing action.

75 If the outer tubular member of the device is made of a synthetic plastic material, it is also advisable to provide the same at its front end with a small bead or flange which serves as a gripping projection on which the outer tube may be pulled to the extended position. This projection also reinforces the tube and increases the contact surface thereof which is pressed upon the body of the patient.

85 Further objects, features, and advantages of the present invention will become apparent from the following detailed description thereof, particularly when read with reference to the accompanying drawings, in which—

Figure 1 shows, partly in section, the head portion of a hypodermic syringe which is provided with a supporting and propelling device according to the invention which is illustrated in the extended position;

95 Figure 2 shows a similar view of a hypodermic syringe with the device according to the invention in the contracted position;

Figure 3 shows a cross section taken along line III—III of Figure 1;

100 Figure 4 shows a view, partly in section, of a modification of the device according to the invention consisting of synthetic plastic material;

Figure 4a shows a partial but enlarged view of the telescopic plastic tubes according to Figure 4 arrested in the extended locked position; while

105 Figure 4b shows a view similar to Figure 4a of the telescopic plastic tubes in the position at the instant of their release from each other.

110 Referring to the drawings, Figure 1 shows a part of the cylinder 1 of a conventional hypodermic syringe, the front end of which is provided with a head portion or mount 3 of the hypodermic needle 2. This head portion 3 may be mounted on cylinder 1 either by being screwed or tightly fitted upon the front end thereof, although any other suitable connecting means may be used. The front end of the head portion 3 is provided with outer screw threads 4 upon which a tubular member 5 may be screwed which member 5 is slotted longitudinally so as to form four longitudinal spring fingers 6, each of which has a small cam-like nose 7 at its end.

125 Tube 5 carries an outer tube 8 so as to be telescopically slidable therein in the longitudinal direction. At its rear portion, the inner wall surface of tube 8 is provided with recesses 9 which are adapted to receive the cam

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portions 7 so that, when tube 8 is pulled forwardly on the other tube 5, these cam portions 7 will snap into recesses 9 and arrest the tubes in the extended position.

5 The front end of the outer tube 8 has outer screw threads upon which a tubular extension sleeve 10 may be screwed to different extents so as to permit the entire tube 8, 10 to be adjusted to different lengths. The rear edge 10 of sleeve 10 may also serve as an abutment on which tube 8 may be gripped to pull it outwardly from tube 5. The spring fingers 6 are made of such a strength that the cam portions 7 thereon will not disengage from recesses 9 until the pressure exerted upon the front edge of the outer tube 8 or its extension sleeve 10 has reached a certain value. The corresponding inclined surfaces on cam portions 7 and the front edges of recesses 9 will then slide along each other and thereby press the spring fingers radially inwardly to such an extent that the cam portions 7 will suddenly disengage from recesses 9, permitting the inner tube with the hypodermic needle therein to be suddenly propelled forwardly and the needle to be plunged into the skin with such a sudden impact that the penetration of the needle will cause no pain. Such sudden and painless insertion of the needle is therefore entirely due to the fact that the person giving the injection and gripping the syringe by its cylinder 1, presses the extended supporting device consisting of tubes 5 and 8 and the extension 10 with such a pressure upon the particular part of the body where the injection is to be made that the locking engagement between tubes 5 and 8 will be suddenly released and tube 5 with the hypodermic needle 2 therein will be quickly propelled within tube 8 from the position shown in Figure 1 to the position shown in Figure 2. The pressure exerted by the front end of tube 8 or extension 10 upon the body will also numb the feeling of the patient around the point of the injection to such an extent that he will hardly feel the sudden impact of the needle.

Since the supporting device which is removably secured by the screw threads 4 to the head portion 3 of the needle has a relatively small diameter, the syringe with the supporting device may also be applied upon the body at an incline so as to permit the hypodermic needle to be inserted in an oblique direction.

55 The modification of the invention as illustrated in Figure 4 differs from the embodiment previously described primarily by the fact that the telescopic tubular members 5¹ and 8¹ consist of a synthetic plastic material. In the extended position of these members, they will be locked to each other by means of a conical portion 12 near the front end of the inner tubular member 5¹ and by a conical portion 13 near the rear end of the outer tubular member 8¹. These conical portions 12 and 13 are made of such an angle that, when in en-

gagement with each other, they will press firmly against each other. Since the plastic material of tubular members 5¹ and 8¹ is slightly resilient the conical portion 13 will become slightly distorted, as indicated in Figure 4a, when the two tubes are pulled outwardly to the fully extended position. This results in a sufficient locking action between the two tubes so that the same effect will be attained as by the spring fingers 6 and their cam noses 7 and the locking recesses 9, as shown in Figures 1 and 2.

When the tubular members 5¹ and 8¹ are pushed together from their extended position, the outer tube 8¹ will be slightly deformed at its weakest point near the base of the conical portion 13 and this point will bulge slightly outwardly, as indicated diagrammatically and slightly overemphasized in Figure 4b. This will suddenly release the tight fit between the conical portions 12 and 13 so that the outer tube 8¹ can suddenly slide backwardly along tube 5¹ and the hypodermic needle 1 can impinge abruptly into the skin. Such sudden release of the conical portions 12 and 13 and the ensuing abrupt forward movement of the hypodermic needle can, however, not occur until a sufficient pressure has been exerted upon the supporting device.

The front end of the outer tube 8¹ may also be provided with a small flange 14 which reinforces the tube and increases the size of the contact surface which engages with the skin. This flange 14 also serves as an abutment on which the outer sleeve 8¹ may be gripped to pull it to the extended position.

An individual insert 15, holding the needle 2, made of plastics material may be inserted in the inner tubular member 5¹ of the supporting device. This insert 15 has a bore formed therein at its end remote from the needle 2 in which the front conical end of the cylinder 1 is adapted to be inserted (Fig. 4). In this way it is possible by means of such an insert 15 for the supporting device to be adapted to fit any syringe cylinder.

There also are special hypodermic needles which, when being turned, automatically fit tightly upon a conical member. In such a case, the front part of the glass syringe is preferably enclosed by a metallic ring which carries the conical member. This conical member may also be provided with a coarse thread for easily securing the hypodermic needle thereon. The supporting device according to the invention may then be secured to the metal ring on the glass syringe. Instead of securing the supporting device to the syringe by screw threads, as shown in Figures 1 and 2, it may of course also be secured thereto by means of a conical seat or a snap joint.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof, I wish to have it understood that it is in no way limited to the de-

tails of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

WHAT I CLAIM IS:—

5 1. In combination with a hypodermic syringe, a device for supporting the syringe and propelling the hypodermic needle thereof for a certain distance into a body portion to receive an injection, comprising a pair of tubular members telescopically slidable along each other, the inner member being secured to the head portion of the needle and surrounding the upper part of the hypodermic needle on said syringe, the outer member having an annular end surface adapted to be placed upon said body portion, and means on said members for locking the same to each other in the extended position, said locking means being adapted to disengage when said tubular members are pressed in the extended position with a certain force upon said body portion so that said tubular members will then be suddenly pushed together and the hypodermic needle will be suddenly plunged into said body portion.

25 2. A device as defined in claim 1, further comprising means for limiting the depth of insertion of the hypodermic needle into said body portion.

30 3. A device as defined in claim 1, further comprising an extension tube adjustably secured to the front end of said outer tubular member for adjusting the effective length of said member.

35 4. A device as defined in claim 3, wherein said extension tube also serves as a means on which said outer tubular member may be gripped to pull the same to the extended position.

40 5. A device as defined in claim 1, wherein said locking means comprise at least one radially resilient portion on one of said tubular members, and a portion on the other tubular member adapted to interengage with said resilient portion in the extended position of said tubular members.

45 6. A device as defined in claim 1, wherein said locking means comprise at least one spring finger on one of said tubular members, a cam-like projection at the free end of said spring finger, said other tubular member having at least one recess therein adapted to receive and interengage with said cam like projection in

the extended position of said tubular members.

7. A device as defined in claim 1, wherein at least one of said tubular members consists of a synthetic plastic material and is also adapted by its inherent resiliency to serve as one part of said locking means. 55

8. A device as defined in claim 1, wherein at least one of said tubular members consists of a resilient, synthetic plastic material said locking means comprising a portion on said member adapted to interengage with a portion on the other tubular member in the extended position of said members, one of said portions being adapted to yield resiliently in a radial direction to release the other portion only when said two extended tubular members are pressed with a certain force toward each other. 60 65 70

9. A device as defined in claim 1, wherein at least one of said tubular members consists of a resilient synthetic plastic material both of said tubular members having conical portions adapted to engage with each other when said members are in the extended position and to frictionally engage each other until said two members are pressed with a certain force toward each other. 80

10. A device as defined in claim 9, wherein the conical portion of said outer tubular member is constructed so as to be deformed and to bulge outwardly from the conical portion on said inner tubular member when sufficient pressure is applied in pushing said extended members toward each other, whereby said bulging outer portion will suddenly release said conical portion on said inner member. 85

11. A device as defined in claim 9, wherein said outer tubular member consists of a synthetic plastic material and has a reinforcing portion at its front end, said reinforcing portion projecting outwardly and adapted to serve as an abutment to permit said outer member to be gripped to pull the same from the contracted position to the extended position. 90 95

12. A device as defined in claim 1, further comprising an adapter having means at one side thereof for securing the same to a hypodermic syringe, said hypodermic needle secured to the other side thereof, and means on said other side for securing said adapter to said inner tubular member. 100

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This drawing is a reproduction of
the Original on a reduced scale.

